



**STATE OF TENNESSEE
DEPARTMENT OF ENVIRONMENT AND CONSERVATION**

DIVISION OF UNDERGROUND STORAGE TANKS

COMPLIANCE GUIDANCE DOCUMENT - 108

**EFFECTIVE DATE - July 29, 1996
(REVISED DATE - July 19, 1999)**

RE: REQUIREMENTS FOR INTERSTITIAL MONITORING

The purpose of this guidance document is to assist the regulated community in understanding the regulatory requirements for *Rule 1200-1-15-.04(3)(g)* Interstitial monitoring. This rule states the following:

Interstitial Monitoring. Interstitial monitoring between the UST system and a secondary barrier immediately around or beneath it may be used, but only if the system is designed, constructed and installed to detect a leak from any portion of the tank that routinely contains petroleum and also meets one of the following requirements:

- 1. For double-walled UST systems, the sampling or testing method can detect a release through the inner wall in any portion of the tank that routinely contains petroleum;*
- 2. For UST systems with a secondary barrier within the excavation zone the sampling or testing method used can detect a release between the UST system and the secondary barrier;*
 - i. The secondary barrier around or beneath the UST system consists of artificially constructed material that is sufficiently thick and impermeable (at least 10 -6 cm/sec for the petroleum stored) to direct a release to the monitoring point and permit its detection;*
 - ii. The barrier is compatible with the petroleum stored so that a release from the UST system will not cause a deterioration of the barrier allowing a release to pass through undetected;*
 - iii. For cathodically protected tanks, the secondary barrier must be installed so that it does not interfere with the proper operation of the cathodic protection system;*
 - iv. The ground water, soil moisture, or rainfall will not render the testing or sampling method used inoperative so that a release could go undetected for more than 30 days;*
 - v. The site is assessed to ensure that the secondary barrier is always above the groundwater and not in a 25-year flood plain, unless the barrier and monitoring components are designed for use under such conditions; and,*

- vi. *Monitoring wells are clearly marked and secured to avoid unauthorized access and tampering.*
3. *For tanks with an internally fitted liner, an automated device can detect a release between the inner wall of the tank and the liner, and the liner is compatible with the substance stored.*

INTRODUCTION

The use of interstitial monitoring as a release detection method for petroleum underground storage tank systems (tanks and piping) involves two elements. First, a barrier is constructed outside the portion of the tank and/or piping routinely containing petroleum. For example, a barrier could be a 4 inch pipe constructed around the outside of a 2 inch pipe. The 2 inch pipe routinely contains petroleum and is considered the primary (inner) pipe. The 4 inch pipe is the secondary (outer) pipe which is considered the barrier. Second, a monitoring system is used to monitor the space between the barrier and the tank/piping. The space between the barrier and tank/piping is called the **interstitial space**. The barrier contains the release so that it may be detected by the monitoring system. The monitoring system could be an electronic monitor or just a way to visually inspect the interstitial space for a release. Interstitial monitoring, if designed and performed properly, will usually detect releases before they can contaminate the environment. Some monitors indicate the physical presence of the free product, either liquid or vapor. Other monitors check for a change in condition that indicates a hole in the tank, such as a loss of pressure or a change in the level of fluid between the walls of a double-walled tank.

Listed below are three type of interstitial monitoring which can be applied to both tanks and piping:

1. ***Double-walled UST systems*** consist of a secondary (outer) tank or pipe that completely surrounds the primary (inner) tank or pipe. This secondary barrier is shaped so that released petroleum will be directed towards a monitoring device or an area where the release can be detected. Some double-walled tanks have fluid, pressurized air, or a vacuum within the interstitial space. If a release occurs then the fluid level or air pressure level will change indicating a release has occurred.
2. ***UST systems with a secondary containment barrier within the excavation zone (tankhold)*** consist of a impermeable liner or vault that completely or partially surrounds the UST system. The barrier holds the release so that it can be detected by a monitoring system. This type of interstitial monitoring can be very complex and requires many factors to be considered before installation begins.
3. ***Internally fitted liners*** consists of a liner (bladder) installed inside of a UST creating a barrier between the stored petroleum and the UST primary (inner) wall. This makes the UST act as the secondary (outer) barrier. Within the interstitial space an electronic device or vacuum is used to detect loss of integrity between either the liner or tank wall. This type of interstitial monitoring only applies to tanks.

REQUIREMENTS FOR INTERSTITIAL MONITORING

Interstitial monitoring systems must be designed, constructed, and installed to detect a release from any portion of the UST system that routinely contains petroleum. Owners and/or operators must ensure the interstitial monitoring system is installed, calibrated, operated, and maintained in accordance with the manufacturer's instructions, including routine maintenance and service checks for operability or running conditions. UST systems must be monitored (manually or automatically) for possible releases at least once every thirty (30) days and also meet one of the following requirements.

1. Double - walled UST systems must comply with the following:
 - A monitoring method for double - walled UST systems must be capable of detecting a release from the primary (inner) wall of any portion of the UST system routinely containing petroleum.
2. UST systems with a secondary containment barrier within the excavation zone must comply with the following:
 - All barriers must be immediately around or beneath the tank and/or piping.
 - An excavation liner or any other type of secondary barrier within the excavation zone must consist of **artificially** constructed material that is sufficiently thick and impermeable. The barrier shall not allow the specific product being stored to pass through any faster than 10^{-6} cm/sec. The barrier shall be made to direct any released petroleum to a monitoring point to allow for its detection. **Note: The containment barrier cannot be constructed of clay or other earthen materials.**
 - The containment barrier must be compatible with the product stored in the UST system so that released petroleum will not cause a deterioration of the barrier allowing a release to pass through undetected.
 - If a UST system is protected from corrosion by a cathodic protection system, then the secondary containment barrier shall not interfere with the proper operation of the cathodic protection system. In most cases this can be achieved simply by ensuring that the components of the cathodic protection system are placed inside the secondary containment barrier.
 - Moisture (e.g. groundwater, soil moisture, precipitation, etc.) must not interfere with leak detection.
 - The site must be assessed to ensure that the secondary barrier is always above the groundwater table and not in a 25-year flood plain. However, a barrier may be used under these conditions if written documentation proves that the barrier and monitoring components are designed to be used under those conditions.

- If monitoring wells are present, they must be clearly marked and secured to avoid unauthorized access and tampering.
3. USTs with internally fitted liners must comply with the following:
- An automatic device must be installed to detect a release between the inner wall of the tank and the liner.
 - The liner must be compatible with the product stored.
1. Electronic sump sensors may be used for pressurized piping systems if they:
- Are a part of a secondary containment system for piping; and
 - Provide a positive shutoff of the submersible pump in case the sensor comes into contact with a liquid or regulated substance; and
 - Operate in a normally closed circuit such that a malfunction of the sensor or an interruption of power would cause the submersible pump to shutoff.

When an interstitial monitoring system is installed and operated according to the above requirements and manufacturer's specifications, it meets the requirements for monthly monitoring. Owners and/or operators should check local rules and regulations to see if any other requirements are necessary.

REPORTING AND RECORD KEEPING

If monitoring results indicate the UST system may have had a release, then the owner and/or operator shall notify the Division within 72 hours and begin release investigation and confirmation steps in accordance with *Rule 1200-1-15-.05(3)*. This applies unless the monitoring device is found to be defective, and is immediately repaired, recalibrated, or replaced, and additional monitoring does not confirm the initial result. If the monitoring device is determined to be defective and a suspected release was not reported to the Division, the owner/operator shall document that the device was defective and the actions taken for correction. This documentation shall also include additional monitoring results.

Monitoring results shall be maintained for the last twelve months and must include, but is not necessarily limited to the following:

1. Printed and signed name of the individual checking and recording monitoring results.
2. Date monitoring system was checked or completed.
3. Results of the monitoring and/or status of the UST system.

4. If a release was suspected, provide name of Division personnel contacted including the date and time.

Records pertaining to the installation of the interstitial monitoring system should be maintained. Records of all calibration, maintenance, and repair of release detection equipment permanently located on-site must be maintained for at least one year after the servicing work is completed. Any schedules of required calibration and maintenance provided by the release detection equipment manufacturer must be retained for five (5) years from the date of installation. Note: Records of UST system repairs must be maintained for the life of the UST system.

Records must be kept at the UST site and immediately available for inspection by the Division; or at a readily available alternative site and be provided for inspection to the Division upon request.

Note: Interstitial monitoring may be used on piping provided that it can detect a release from any portion of the underground piping that routinely contains petroleum. For additional information concerning release detection requirements on UST piping, please see Compliance Guidance Document (CGD)-110 for pressurized piping or CGD-111 for suction piping.